

July 31, 2014

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51.366 Data Report for 2013

Dear Brian:

Attached are the data from the northern Virginia I/M program in response to the requirements of CFR 40 Section 51.366, Data and Analysis Reporting, for calendar year 2013. We have included an explanatory narrative below. Throughout, DEQ assumes only Initial test result data are requested, unless otherwise specified.

Narrative:

51.366 (a)

For each requirement in (a), five sets of data sheets are submitted for each vehicle type entitled: all, P, T1, T2, and H. For 2013 calendar year data, for each vehicle type there is one sheet providing counts and (where applicable) one sheet providing percentages. All data are taken from the VID reporting database from which spurious and test VINs have been removed (e.g., TESTSPX0001234567). Raw data are extracted from a contractor-provided Excel pivot table, test type by test type, and are copied to Excel summary sheets entitled 51.366 (a) (1)..., etc. where any adjustments are performed (e.g., "C" test correction – see below). These files are linked for calculation of percentages (e.g., fail rate).

51.366 (a) (1) Number of vehicles tested by model year and vehicle type.

A total of 868,281 vehicles received an initial I/M test; or an initial remote sensing NOV or clean screen in 2013. This is an increase of 5.1% from 2012. Passenger vehicles (LDGV) comprised 55.9% of the fleet, light duty trucks up to 6,000 lbs GVWR (LDGT1) comprised 29.7%, light duty trucks 6,000 lbs to 8,500 lbs GVWR (LDGT2) comprised 12.6%, and heavy duty vehicles 8,501 – 10,000 lbs (HDGV) comprised 1.9%. The average model year for passenger vehicles was 2005, 2005 for LDGT1, 2006 for LDGT2 and 2004 for HDGV. This is about the same fleet in terms of vehicle age than we had in 2012. DEQ also breaks down the number of vehicles tested by Test Type Performed. Overall, 94.8% of the IM fleet received only an OBD test, 4.0% received an ASM test, 0.9% received a TSI test and 0.3% received both an OBD and tailpipe test. A chart is provided showing the model year distribution. It is apparent that vehicle registrations fluctuate from year to year.

DEQ created a "workaround" in order to determine the number of initial tests per unique vehicle. This is because the Northern Virginia analyzer system (NVAS) allows tests off-line. This can result in multiple tests being keyed as Test Type = "I" for initial by the inspector. Also, a valid Test Result of "I" for "incomplete" is considered an initial test for purposes of receiving a free retest within 14 days, but not for purposes of evaluating initial test emissions status. As a workaround, a field, Test Type Update was created. When a record is transferred to the VID reporting database, a procedure populates the Test Type Update field based on a scan of previous existing records. This procedure

should result in only one initial test per VIN per test cycle. The Test Type Update field also provides for identifying waiver results that are duplicates or not final results (i.e., more than one waiver result per test cycle, or a waiver result followed by a passing result). Because of a change in VID contractors, Test Type Update data is not available for tests done on Dec. 31 and tests done off-line that went to the VID after Dec. 30.

In 2005, DEQ started OBD testing (phased in May through September) and in August of 2006 the On-Road Emissions (ORE) program was started. Consequently, four new Test Type Performed results were added: "O" = OBD, "B" = OBD + ASM, "C" = OBD + TSI, and "R" designating either an ORE fail with a notice of violation (NOV) or a pass if a clean screen notice was authorized. ORE tests are valid initial tests although they may occur out of cycle. The "B" and "C" tests are applicable for an ORE confirmation test, wherein both an OBD test (if applicable) and a tailpipe test are required to pass. The DEQ VID application is also able to flag certain OBD vehicles with known OBD problems to also receive a tailpipe test. We started using this feature in January 2012. Most of these vehicles received "B" tests.

For vehicle type = H, a Test Type Performed coding anomaly has occurred. OBD tests are attempted on all H vehicles but the analyzer software then goes to TSI if the vehicle is shown to not be OBD compliant. In these cases, equipment software enters C for OBD + TSI instead of T for TSI. This affects the H statistics. Most of these "T" tests should have been TSI tests. Data for 51.366 (a) (1) and data in following sections have been corrected. See discussion below. This will be corrected with the new vendor in 2014.

The Overall Test Result entry in column "R" indicates an On Road Emissions (ORE) test result. These can either be fail (NOV issued) or pass (Clean Screen issued). The failed remote sensing tests (NOVs) are "out of synch" in that, in general, the vehicle had already received a regular biennial IM test in the current test cycle. ORE NOVs and clean screens are tracked manually. With respect to 2013 VID query results, there were 237 "R tests" on the VID in 2013 while there were actually 321 NOVs and 161 clean screens. Thus, not all "R tests" are counted because the Test Type Update procedure may count some as retests. The "R" tests that are initial test are counted in 51.266 (a)(1) since they are an actual initial test for the purposes of determining the number of vehicles tested. Of the 243 initial "R" tests, 142 were initial pass, corresponding to a clean screen, and 95 were initial fail corresponding to an NOV. Note that in previous 51.366 reports DEQ had not counted "R" tests in the results. The difference is statistically insignificant.

51.366 (a) (2) By model year and vehicle type the number and percent of vehicles:

(i) Failing initially, per test type.

Overall 34,950 vehicles failed their initial IM test (or an "initial" ORE fail). The overall fail rate for 2013 was 4.0%. The fail rate was greatest for "H" vehicles, 6.3%, and least for "M" vehicles, 3.8%. "T" and "P" vehicles were 4.0 % and 4.0% respectively. The most prevalent (most vehicles) failing model year was 2001; the highest fail rate (up to 24 years old) was 1991.

(ii) Failing the first retest per test type.

Overall percent of vehicles failing their first retest for 2013 was 12.6%. This is as a percent of vehicles failing their initial test. Overall percent of vehicles failing their first retest for 2013 was 15.3% as a percent of vehicles which received a first retest.

(iii) Passing the first retest per test type.

The overall percent of vehicles passing their first retest for 2013 was 69.7% as a percent of vehicles failing their initial test. The percentages failing and passing the first retest do not add to 100% because some vehicles never return for a retest. The overall percent of vehicles passing their first retest for 2013 was 84.7% as a percent of vehicles which received a first retest.

(iv) Initially failed vehicles passing the second or subsequent retest per test type.

The overall percent of vehicles passing their second or subsequent retest for 2013 was 15.2%. This is as a percent of vehicles which failed their initial test. As a percent of vehicles which received a second retest the percentage is 18.4%. These data are determined by subtracting the number of First Retest Pass in (iii) above from the number of "Last Retest Pass" (VID query name "Retest Pass"). Last Retest Pass is determined by the last passing retest record in a test cycle for each VIN.

(v) Initially failed vehicles receiving a waiver

A total of 509 waivers were issued in 2013. The overall waiver rate for 2013 was 1.5% as a percent of vehicles failing the initial test. The waiver rate was largest for "H" vehicles, 2.5%, which also had the largest fail rate.

(vi) Vehicles with no final outcome (regardless of reason)

These are determined by subtracting the number of vehicles with known final outcome (retest pass or waiver) from the number of initial fails. VA has determined that these are typically retired vehicles. Overall, the number of retired vehicles is consistent with the number of new vehicles plus vehicles entering the area, considering growth. Unusual results (negative or large percentages) for a particular test type performed, vehicle type and model year can be due to a combination of small category totals plus year-end overlapping. For example, a retest pass can occur in 2014 for a vehicle that actually failed initially in 2013.

Using this subtraction methodology, 4,663 vehicles, or 13.3% of the initial fails, failed an initial test in 2013 without receiving an eventual pass or waiver. The percentages submitted are in terms of percent of initially failing vehicles. This is slightly higher than the percentage in 2012 of 13.2% but is identical to 2011. Although highly dependent on the fleet turnover, this percentage has decreased since first calculated for the enhanced IM program in 1999 and is now leveling off. For the years 1999 through 2001 the average was 22%.

DEQ did an in-depth analysis of calendar year 2004 vehicles with no final outcome. This analysis used "data mining" results from an EPA audit conducted in late 2005. This audit determined that 7014 vehicles initially tested in 2004 had no known final outcome. This was slightly larger than the total number reported

using the subtraction methodology in the 2004 51.366(a)(2)(vi) report - 6,300. The EPA audit tracked actual VINs.

In view of the above discussion, it is difficult to develop an accurate measure of “disappearing vehicles.” In 2007 DEQ implemented a VID query system using CARS (Compliance Auditing and Reporting System) to track VINs and determine their final outcome. CARS has been designed to address the EPA recommendations on the follow up of vehicles with no known final outcome. It also can be used to monitor the time it takes to obtain a pass result after the first failure. The system identifies VINs of vehicles which have failed their initial test and have not passed or received a waiver after various time periods. The system queries the DMV registration database and determines if the vehicle is, (1) De-registered, (2) registered out of the IM area in Virginia, or (3) “Outstanding.” For the outstanding vehicles the system also determines whether they have been observed by remote sensing in the IM area and, if so, the date of last observation.

Using this system for vehicles last failing in 2013, at the end of the calendar year there were 6,048 “outstanding” after 30 days. This measure is significantly larger than the “mass balance” method result of 4,663. This is most likely because vehicles repaired in 2014 were not counted due to the VID contractor change. In previous years the two measures had been closer.

Vehicles take a period of time to stabilize as “outstanding.” (See 2013 (a)(2)(vi) Unknown outcome -2.pdf Chart: “% No Known Outcome,> 30 days from last fail Date.”) When the status of vehicles failed after January 1, 2006 is charted in sequential months through March 2013, the percentage of “outstanding” vehicles relative to the initial failures increases from about 5% for Jan 2006 failures to about a constant 10% until January 2013 when it increases to about 13% for September 2013 failures. This indicates that a significant portion of the failures take up to 3 months to get repaired and passed or waived. Data show that many take much as a year or longer.

A relevant consideration is whether these “outstanding” vehicles are actually being driven in the IM area. If they are not, the registration enforcement would seem to be working well. Some vehicles might not have been reported as de-registered from the IM area. Many vehicles are decommissioned without notifying DMV. The 6,048 vehicles which last failed in 2013 (not the same as initial fails in 2013) were evaluated as of March 18, 2013. Only 84 of these had been observed operating in the IM area by remote sensing after 60 days from the latest fail, and only 49 were observed driving over 120 days after the latest fail.

(vii –x) Not applicable

(xi) Passing the on-board diagnostic check

Data are queried directly from the VID query pivot table and calculations are linked to 2013 (a)(1) Number of Vehicles Per Test Type.xls for percentages minus 2013 (a)(2)(i) Initial Fail. C = OBD + TSI data have been corrected. The number of actual initial OBD passing tests is 747,446 or 96.3% overall pass rate.

(xii) Failing the on-board diagnostic check test

Data are taken directly from 2013 (a)(2)(i) Fail Initial for raw data and are linked to 2013 (a)(1) Number of Vehicles Per Test Type.xlsx for percentages and 2013 (a)(2)(i) Initial Fail. 29,563 vehicles failed their initial OBD test or 3.8%.

(xiii) Failing the on-board diagnostic check and passing the tailpipe test

The Virginia analyzer software has the capability to conduct dual testing in certain circumstances. DEQ has the ability to require that both the OBD and tailpipe test be passed for certain vehicle models by means of a flag in the vehicle lookup table. Also, OBD vehicles that fail an On-Road Emissions test are required to receive a confirmation test which includes both an OBD and tailpipe test. Currently for test types "B" and "C" the VID is not able to distinguish between ORE confirmation tests and tests done on problem OBD vehicles. Therefore no data analysis has been done to determine relative tailpipe versus OBD test results.

(xiv) Failing the on-board diagnostic check and failing the tailpipe

See (xiii)

(xv) Passing the on-board diagnostic check and failing the I/M gas cap evaporative system test

DEQ assumes EPA is requesting results of only the I/M gas cap pressure test as DEQ does not perform an evaporative system test. The percentage is calculated relative to vehicles passing the OBD test. Overall 607 or only 0.076% of the vehicles passing the OBD test failed the gas cap test (a whopping 0.001% more than last year). These do not include gas caps that were replaced during the test – which is allowed in Virginia so as not to require a complete new retest. Thus it accurately indicates faulty gas caps that were not detected by OBD – or perhaps a faulty gas cap pressure test.

(xvi) Failing the on-board diagnostic check and passing the I/M gas cap evaporative system test

The comments in (xv) apply. DEQ would like to point out that the statistics in xvi -xviii have little use. Nonetheless, 26,931 vehicles or 91.1% failed the OBD test (probably for something unrelated) while passing the IM gas cap test. The percentage is calculated relative to vehicles failing the OBD test.

(xvii) Passing both the on-board diagnostic check and I/M gas cap evaporative system test

The comments in (xvi) apply except percentage is calculated relative to vehicles passing the OBD test. Overall 42,948 or 93.3% of the vehicles passing the OBD test also passed the gas cap test. The percentage of (xv) and (xvii) do not total 100% because some gas caps are untestable, therefore no gas cap result is entered.

(xviii) Failing both the on-board diagnostic check and I/M gas cap evaporative system test

The comments in (xvi) apply. Overall 336 or 1.1% of the vehicles failing the OBD test also failed the gas cap test, a strikingly meaningless statistic. The percentages are based on the percent of vehicles failing the OBD test.

(xix) MIL is commanded on and no codes are stored

The percentage is calculated relative to total records with the MIL commanded on. Overall, the MIL is commanded on and DTCs are not stored for only 441 records or 1.78% of records with MIL commanded on. H vehicles 1996 to 2004 have a high percentage of MIL on with no DTCs because many of these vehicles are not fully OBD-II compliant. In VA an OBD test is started but goes to TSI if there are OBD anomalies. In this situation, they do not fail for OBD but the OBD results are logged on the record. . There were 174 such records, or 29% of records that were H vehicles with, "C" tests that had not DTCs. Without model years 1996 to 2004 the H percentage is only 2.1%.

There was also a relatively high percentage of P, T1 and T2 vehicles from 2005 on. Without these model years the overall percentage drops from 1.8% to 0.24%. Further investigation as to the cause of the models causing this is warranted.

(xx) MIL is not commanded on and codes are stored

The percentage is calculated relative to total records with the MIL not commanded on. Overall, only 13 or 0.0017% of the records with MIL not commanded on had DTCs stored. Not a major problem!

(xxi) MIL is commanded on and codes are stored

The percentage is calculated relative to total records with the MIL commanded on and is equal to 1 minus the percentage calculated in (xix) – more or less, a no-brainer. The same anomalies are noted as in (xix).

(xxii) MIL is not commanded on and codes are not stored

The percentage is calculated relative to total records with the MIL not commanded on. Overall, 99.999% of the records with MIL not commanded on had no DTCs stored. Not a major problem – we continue to wonder why EPA requires this information!

(xxiii) Readiness status indicates that the evaluation is not complete for any module supported by on-board diagnostic systems

The percentage is calculated relative to total OBD initial tests. In Virginia, vehicles that have more than the allowed monitors not ready are rejected from testing. This results in an overall test result of "Abort." The number of vehicles with non-aborted not-ready status is counted and the percentage is determined relative to the number of complete OBD tests, i.e., not including those "rejected from testing." Overall 8.5% of the initial OBD tests had at least one monitor not ready. There is a significant decrease with model year 2001 and newer: 1996 – 2000 averaged 26.5% tests with at least one monitor not ready, but only 6.7% for model years 2001 - 2014. For H vehicles the percentage with at least one monitor not ready is 40.4% for model years 1996 - 2004 perhaps due to the fact that some vehicles that were not really OBD compliant. H vehicles 2008 and newer were not ready only 7.2% of initial tests.

51.366 (a) (3) The initial test volume by model year and test station

The data include tests back to model year 1968 for all calendar years. Virginia required testing back to model year 1968 until July 1, 2000 when the testing requirement was

changed to include only vehicles 24 year old and newer. Some vehicles over 24 years old still may continue to receive emissions tests even though they are not required to do so. Vehicles back to model year 1968 are subject to the ORE program and may receive a confirmation test and retest after repairs.

Data are sorted by station number and by test volume. There were 553 stations in operation in 2013 but not all of these stations are necessarily currently active; but they were active part of 2013. The station type, test volume and average model year tested are included. This helps distinguish new testing stations, fleets and dealerships which have atypical clientele or test volume. The average number of yearly tests per station was 1570. Note that the ORE tests are categorized as having an inspection station #1928. The number of tests in the By-Station count does not equal the number in (a)(1) because 86 records for December 31 did not include station numbers.

51.366 (a) (4) The initial test fail rate by model year and test station

Data are sorted by station number and by fail rate. 127 stations had an overall fail rate less than 2%. The station use code is given. By far the lowest fail rate was private fleets. Used car dealerships had the highest failrate.

51.366 (a) (5) The average increase or decrease in tailpipe emission levels for HC, CO, and NOx after repairs by model year and vehicle type for vehicles receiving mass emissions test.

Not required of ASM programs. Also, only 6.38% of the IM fleet received a tailpipe test. Nonetheless, this data is included in terms of percentage emissions reduction. Only ASM data from pre-OBD vehicles in the regular IM program (MY 1889 through 1995) are included because very few vehicles older than 1989 or newer than 1995 received an ASM test. Data are presented in different charts. (1) Charts labeled (HC, CO, NO) show average emissions for initial pass – initial fail – retest pass – and retest fail/waiver for the three pollutants; (2) Charts labeled (init HC, init CO, init NO) show average emissions for initial pass and initial fail for each ASM test mode; and (3) Charts labeled (IF-RP%HC, IF-RP%CO, IF-RP%NO) show average emissions for initial fail minus retest pass. These charts indicate that the average vehicle failing the ASM test achieved after repairs reductions of about 65% for HC, 80% for CO and 55% for NO. The final two charts, % InitEmis and %EmisRed show relative emissions and emissions reduction for model years 1989 – 1995.

51.366 (b) Quality assurance report

These data are compile by the Northern Virginia compliance staff and are included in the attached sheet, 2013 (b)(c)&(d)(1)(v) Quality assurance & Quality control & Enforcement report.pdf, for calendar year 2013.

Regarding Item 51.366 (b)(3)(ii) - Covert audits conducted with the vehicle set to fail any combination of two or more test types, could not be reasonably determined since two (or more) test types are currently performed only on remote sensing ORE program failures during the confirmation test. CTs are actually audited one-by-one to ensure the correct test types are performed. Doing this covertly is not possible.

51.366 (c) Quality control report

These data are compile by the Northern Virginia compliance staff and are included in the attached sheet, 2013 (b)(c)&(d)(1)(v) Quality assurance & Quality control & Enforcement report.doc, for calendar year 2013.

51.366 (d) Enforcement report**51.366 (d) (1)(i) An estimate of the number of vehicles subject to the program including the results of an analysis of the registration database.**

DMV registration count data are taken from an annual VA DMV summary report by jurisdiction which is compiled every year on July 1 to determine the number of vehicles subject to the IM program. This summary data has historically been used for the "registration count" used in this section. However beginning in 2007 DMV has also provided the detailed registration record data by VIN.

In 2011 DEQ performed a VIN decode study on VINs and found that DMV had incorrectly categorized several vehicle types, particularly LDDT. This did not affect IM eligibility. DEQ also updated the allowance made for HDGVs over 10,000 GVWR. Using the HDGV percentage from the 2011 VIN decode, the number of vehicles subject to IM as of 7/1/2013 was determined to be 1,544,186.

51.366 (d) (1)(ii) The percentage of motorist compliance based upon a comparison of the number of valid final tests with the number of subject vehicles.

The comparison for this section has historically been calculated based on one-half of the vehicles registered as LDGV, LDGT1, LDGT2 or HDGV based on the DMV 7/1/2013 registration run. We have not attempted to compare counts by vehicle type. This method may underestimate actual registrations if new registrations exceed expired registrations in the second half of the year.

There are also other complications with the concept of comparing DMV registration counts with I/M initial test counts due to the transient nature of the registration database. The northern Virginia area has a more transient population than other areas. This is evidenced by the greater number of initial emission tests than registrations, particularly for vehicles 2 to 4 years old. Older model years tend to have more registrations than initial inspections. This is due to a larger proportion of older vehicles that are due to retire and vehicles that have already retired (dead records). The number of "retired vehicles" is commensurate with the number of new and used vehicles sold. Overall, the total number of passing (or waiver) vehicles age 2 to 24 years is 803,605. This is 104.1% of the number of the July registration count divided by two. In 2010 and 2011 it was 101.2%. In 2009 it was 100.4% and in 2008 it was 98.2%. This illustrates that the ratio of total passes and waivers to July registrations is not a consistent measure of program compliance. This is because newer vehicles may get inspected upon resale by the dealer even though a new inspection is not required for registration. The current VID system for counting VINs does not accurately provide a means to determine how many such vehicles are "double tested." Likewise, we cannot accurately determine how many old vehicle registrations are "dead" registrations, although the remote sensing data can assist in this determination (see section 51.366 (a) (2)(vi).)

51.366 (d) (1)(iii) The total number of compliance documents issued to inspection stations.

DEQ does not issue “compliance documents” which are interpreted to be inspection stickers to the stations because VA has a registration denial system.

51.366 (d) (1)(iv) The number of missing compliance documents

DEQ has no “compliance documents” per se (i.e., stickers or controlled VIRs) and is not aware of any missing inspection records on the IM database.

51.366 (d) (1)(v) The number of time extensions and other exemptions granted to motorists

No exemptions are issued by DEQ for vehicle subject to the program. Time extensions, or “out of state deferrals,” are available under certain circumstances to vehicles out of the area at the time the inspection is due. In addition Virginia DMV may issue a one time, one month temporary registration to enable a vehicle to get repairs.

| | |
|--------------------------------------------------------------------------------------------------------|-----|
| Out of state deferrals issued | 122 |
| Exemption letters issued for non-conforming vehicles (NOT subject to program) | 12 |
| Exemption letters issued for overweight vehicles >10,000 lbs GVWR (NOT subject to program) | 152 |
| Exemptions issued for overweight diesel vehicles (OBD II) (NOT subject to program) (GVWR > 8,500 lbs.) | 178 |

51.366 (d) (1)(vi) The number of compliance surveys conducted, number of vehicles surveyed and the compliance rates found in such audits.

No compliance surveys have been done per se. DEQ assumes EPA is referring to surveys to determine whether vehicles are operating with valid, unexpired registrations. DEQ has relied on Virginia Dept of State Police records which have indicated that driving unregistered incidence is under 1% and DEQ has used this figure in modeling. However, DEQ gathers information in its remote sensing program that is similar to data collected in compliance surveys. For example, if a VA license plate observed through the ORE program is not recognized by DMV, this may be an unregistered vehicle. DEQ intends to investigate statistical methods to use the ORE data to identify registration compliance. DEQ welcomes EPA’s suggestions on how to utilize this robust dataset.

51.366 (d) (2) Registration denial based enforcement programs shall provide the following additional information:

(i) A report of the program’s efforts and actions to prevent motorists from falsely registering out of the program area or falsely changing fuel type or weight on the vehicle registration, and the results of special studies to investigate the frequency of such activity.

With respect to falsely registering out of the program area, DEQ currently identifies high emitting vehicles using the ORE program that are registered outside the IM area but are determined to be “operated primarily” inside the IM area. Also the CARS application module tracks VINs that fail an emissions test but never return for a retest pass or waiver against the DMV database to see if these vehicles are registered elsewhere in Virginia and also if these vehicles are observed driving within the IM area by the remote sensing ORE program. The average number of initial failing vehicles that register outside the IM area is 2%. We do not know if the vehicle was sold out-of-area (what we want) or falsely registered out-of-area (what we don’t want), except for the observations within the IM area. These data are shown in charts at 2013 (a)(2)(vi) Unknown outcome.

Similarly, vehicles observed by remote sensing that are incorrectly registered with, for example, a fuel type of diesel, or vehicles incorrectly registered with a GVWR over 10,000 are still subject to the remote sensing high emitter identification program because a VIN decode is used to determine vehicle eligibility – not the DMV registration data. DEQ issues Notices of Violation (NOVs) to such vehicles and requires them to get a confirmation test and if necessary be repaired. Currently three observations are required to deem a vehicle subject to ORE if it is registered out of the IM area. Very few out-of-area vehicles meet this criterion. We expect the future increase in remote sensing will produce better coverage of any such vehicles (see 51.366 (e) (1)).

With respect to changing fuel type or weight on the vehicle registration, DEQ receives registration data from DMV every July 1. To the extent possible this data is analyzed to determine if vehicles are correctly registered with respect to weight and fuel. Complete analysis requires doing a VIN decode to determine correct weight and fuel. DEQ performed a complete VIN decode in fall of 2011. A summary of the results was provided in the 2012 EPA 51.366 report in section (d) (2)(ii). In the future, our VID contractor will perform a complete VIN decode at least quarterly.

(ii) The number of registration file audits, number of registrations reviewed and the compliance rates found in such audits.

DEQ Audit of 7-1-2013 DMV Registration Data

The DMV provides registration data annually to DEQ in two ways: (1) summary information which gives the totals by model year and garaged jurisdiction for DMV-determined Mobile5 vehicle type categories and (2) registrations by VIN giving key vehicle record information. DMV may not necessarily use the same criteria employed to prompt vehicles for IM for registration as to determine the summary data categories in data (1). Historically DEQ has used the counts in data (1) to determine the comparison in 51.366 (d) (1)(i) . Comparing the two data sources is not straight forward. For example, the summary data combines all model years greater than 23 in one figure so the MY=24 count must be

extrapolated to get the number of vehicles subject to biennial IM. Also, comparing Mobile5 classes with DMV vehicle types is not always clear.

The total vehicle count comparisons (not including trailers, non-powered vehicles and equipment) are:

| | Total VA | IM Area all | IM veh all MY IM (0-24MY) | |
|-------------|-----------|-------------|---------------------------|-----------|
| (1) Summary | 7,010,692 | 1,920,127 | 1,841,106 | 1,791,105 |
| (2) VINs | 7,033,282 | 1,920,567 | 1,812,807 | 1,777,937 |

It appears the DMV summary method might slightly overestimate the number of vehicles subject to biennial IM. However, without a VIN decode the VIN analysis is not complete.

Note: For VIN query, use DMV VehicleType <> (BT, CG, CT, EQ, GC, HD, HT, LS, MH, OT,TD,TL ,UT) and <> (MB, MC, MP) for motorcycles and Key <> (CARGO TRL, MH). A minor problem is that the DMV "VehicleType" field is not a unique primary key; not all the records necessarily match the description – however almost all do. For IM (0-24MY) counts, both methods (1) and (2) count only LDDVs 1997 and newer.

The DMV prompts vehicles for inspection based on model year, weight, fuel, vehicle type and garaged jurisdiction. All but model year are subject to errors in data entry and may be used to circumvent emissions inspection requirements. A detailed analysis was done in 2012 using VIN decode data from 2011. DEQ plans to obtain VIN decode information for the 2014 registration data in fall of 2014. The next annual report will more fully analyze the error categories vehicle weight, vehicle type and fuel. Garaged jurisdiction on the DMV registration will be analyzed using remote sensing data.

Vehicle Weight – not analyzed for errors in 2013

To prompt IM diesel vehicles (GVWR up to 8,500 and model year 1997 and newer) DMV uses GVWR if it is available, and gross vehicle weight (GVW) if GVWR is not available. For gasoline vehicles they use the GVW or empty weight (EW) if GVW is not available (e.g., buses and motor homes have no GVW on record) because the GVWR is often incorrect for gasoline. Only model years 1989 (1997 for diesels) through 2011 were used to compare IM counts with DMV registrations. Determining which vehicles are subject to IM without a VIN decode to verify weight proved difficult. Simply using the criterion that all of GVWR, GVW and EW are in the IM weight range is not 100% reliable for the following reasons:

DMV captures GVWR or GVW for only a few vehicles with types PASS CARRY and BUS. For diesel vehicles, DMV does not capture GVWR for many Ford Excursions which have GVWR over 8500. Many of these vehicles were documented by DEQ to receive a "C" permanent IM exemption on the DMV record. No BUS "C" records exist, so it appears DMV does not prompt any diesel BUS vehicle types. All BUS entries seemed to be legitimate.

However, for 2013 DEQ used the selection criteria GVWR, GVW and EW are in the IM weight range.

Fuel – potentially 289 vehicles avoiding inspections

As more and more vehicles use non-conventional fuels, the fuel type is becoming more important in IM programs. DMV fuel type fields do not accommodate all possible new fuel types. A VIN decode is needed to fully analyze for errors in fuel type coding. However, some anomalies were observed. DEQ did a check of records with “IM Fuel” listed as “N”. “IM Fuel” is a field inserted in the DMV fuels table translating DMV fuels into their IM status – either G, D, or N. There are a few DMV fuel types that DEQ has designated as IM Fuel = “N” because most of the records were thought to be non-IM vehicles. However, not all DMV records with these fuel types are correct, and these need to be distinguished from the valid dedicated alternative fuel models. Also, some valid “non-fuel”s did not get eliminated by querying VehicleType – as it is not unique. For example DMV VehicleType = TR includes both vehicles not subject to IM such as Key = CARGO TRL, SH BUS, and vehicles subject to IM such as Key = DS and TRAILER JCKY.

There are legitimate electric vehicles such as GEM, VANTAGE, TESLA, FISKER, MITSUBISHI I-MIEV (2015), CHEVROLET SPARK (2015) and NISSAN LEAF. After accounting for known electric and exempt hybrid vehicles there were 1236 vehicles registered with non-IM fuels.

Also there are legitimate OEM dedicated CNG vehicles such as HONDA CIVIC. Sorting these out was difficult. We looked at the VIN decode data done in 2011 that found 36 CMG Honda Civics in the IM – all had VIN digit #7 = 6 and “F” for 2011. Using these criteria, of the 58 Civics with fuel = N, 46 actually are probably CNG vehicles, although DMV has various fuel types. There are also other legitimate CNG OEM models, according to the 2011 VIN decode, although it is not certain these are all dedicated CNG. They include various models that are present in 2013: Dodge Caravan (6), and Ram Truck (7) models; and Ford Crown Victoria (4), Econoline (8), and F150/250/350 (5) models. Allowing that all these models may be dedicated CNG vehicles there are still 1135 vehicles that have non-IM fuels on the DMV record. However, 460 of these have passed an IM test, so at least for these the fuel type was apparently an error and not an attempt to avoid an IM test.

Most of the remaining 685 with non-IM fuels were DMV fuel type “C” for CNG. There were 496 of these. Some of these may be valid CNG conversions which do not show up on a VIN decode. It is not known if CNG conversions are typically dual fuel or dedicated. Some are known dual-fuel vehicles such as the Chevrolet Cavalier – but only 26 never have received an IM test. There were 43 Chevrolet Express Vans that decoded as LC8 - ENGINE FLEXIBLE FUEL, (CNG/LPG), 8 CYL, V8, 6.0L. Thus it appears that most of non-Honda CIVIC, OEM “C” vehicles are dual fuel or flex-fuel.

There were also 134 vehicles with “L” or “P” codes for LPG. They were almost all for 2013 Ford models - mostly Explorers. The VINs decode as fuel = gasoline; these are probably flex-fuel vehicles. Most were 2012 or 2013 so we do not know if DMV will prompt these for inspection.

There were 21 vehicles with DMV fuel “A” for Ethane – all 2012 or 2013 but of various models. These are somewhat of a mystery as no known vehicle runs on ethane. It could be confused with an ethanol flex-fuel vehicle. The other remaining fuels were “H” for hydrogen which all should have been hybrids, and “S” for solar (4) which is anyone’s guess.

Fuels summary –

Eliminating model year vehicles 2012 and 2013, there are only 289 vehicles remaining after excluding known electric vehicles, dedicated CNG, possible dedicated CNG conversions, etc., there are only 286 vehicles remaining that appear to have missed an IM test due to incorrect fuel type. However, due to the large number of incorrect fuel types in model years 2012 and 2013 – and we expect more in 2014 – this is an issue we need to resolve with DMV.

Emissions Status field analysis

DMV uses the “Emissions Status” and the “Inspection Due Date” fields in the vehicle record to determine whether an inspection is required. The emissions status field contains various flags shown below. An entry is overridden when changed with no history file. For example, we do not know if a “P” emissions inspection has expired. This will change in 2014 when DMV will begin supplying this information.

| EMSTATUS | Description | Comment |
|----------|---------------------|-----------------------------------------------------------------------------------|
| A | ADMINISTRATIVE | No longer used by DMV staff. |
| B | EXTENSION | 30 day extension given by DMV for emissions testing |
| C | PERMANENT EXEMPTION | Exemption given by DEQ; For example, for diesel vehicles over a GVWR of 8,500 lbs |
| D | DEALER | 1 year exemption. Is a valid code, but not used by DMV staff |
| F | FAILED | Previously sent by IM VID, no longer valid |
| M | MANUFACTURER | For new vehicles. |
| P | PASSED | Sent by IM VID |
| S | ORE FAIL | Sent by IM VID |
| W | WAIVER | Sent by IM VID |

For vehicles subject to IM we found the following for various model year periods. It is expected that some of the status entries will change depending on model year – such as “M”, and NULL – no entry:

| IM area_IM veh | 0-24 | 2-24 | 4-24 | 10-24 |
|-----------------------------|--------------|--------------|--------------|--------------|
| DMV_EmissionStatus | Total Of VIN | Total Of VIN | Total Of VIN | Total Of VIN |
| Null | 15094 | 10127 | 7980 | 3941 |
| A | 24 | 24 | 24 | 24 |
| B | 9525 | 9394 | 9016 | 6494 |
| C | 1003 | 923 | 833 | 386 |
| D | 64 | 58 | 45 | 22 |
| F | 10 | 8 | 8 | 5 |
| M | 274815 | 55845 | 8353 | 1047 |
| P | 1477061 | 1455665 | 1272424 | 585691 |
| S | 122 | 122 | 121 | 118 |
| W | 892 | 892 | 888 | 723 |
| PERCENT OF P + S + W | | | | |
| Null | 1.0% | 0.7% | 0.6% | 0.7% |
| A | 0.0% | 0.0% | 0.0% | 0.0% |
| B | 0.6% | 0.6% | 0.7% | 1.1% |
| C | 0.1% | 0.1% | 0.1% | 0.1% |
| D | 0.0% | 0.0% | 0.0% | 0.0% |
| F | 0.0% | 0.0% | 0.0% | 0.0% |
| M | 18.6% | 3.8% | 0.7% | 0.2% |

For 2013, the analysis focuses on just on “C”, “M”, and null emissions status. “A” and “F” entries appear to be artifacts that can be investigated. “D” entries are curious – there shouldn’t be any. “M” entries significantly decrease when eliminating newer vehicles but still remain significantly high. “B” entries seem legitimate but could be audited to determine final outcome.

“C” Emissions Status – 907 potential missing vehicles

DMV records the emissions test history status in a field “Emissions Status.” When a vehicle is prompted for emissions by DMV but the vehicle is not subject to IM, DEQ notifies DMV that the vehicle is exempt and DMV enters a “C” in the emissions status field of the DMV vehicle record. DEQ keeps track of VINs for which a “C” letter was issued. In the 7/1/2013 DMV registration database there were 1003 VINs with a “C” which could be subject to IM. DEQ maintains a report of “C” requests sent to DMV back as far as 2008. These VINs were compared with the 1003 and it was found that 1107 vehicles had “C” emissions status with no record of DEQ issuing the exemption. For the 139 diesel vehicles it appears that most would be exempted, but at least 47 are clearly incorrect. For the 968 gasoline vehicles there are at least 860 that are clearly incorrect.

Null Emissions Status

In the 2012 EPA report DEQ stated that a problem had been found in the way DMV processed write-in registration renewals. There was no verification of IM status for these registrants. This was brought to DMV's attention in 2012 and procedures were put in place to correct DMV practices for mail-in registration renewals beginning approximately January 2013.

The number of Null emissions status vehicles is 15,096 in the 0-24 model year range but drops off to 7,980 in the 4-24 model year range, by which time vehicles should have received an emissions inspection. The percentage of Null vehicles (compared to total valid records P+S+W) decreases from 0-24 to 4-24 and after 10 years. In the 2012 data, there were a total of 14,800 vehicles in the 0-24 model year range with Null emissions status and 7,362 in the 4-24 model year range. This indicates that this problem may have gotten a bit worse from July 2012 to July 2013. However, the 2013 data includes IM fuel "N" which included many vehicle subject to IM. DEQ will evaluate the effect of this change with the July 1, 2014 DMV registration data evaluation. We expect that it will take two years from January 2013 to fully rectify the effects of the DMV registration problem.

"M" Emissions Status

The percentage of "M" emissions status vehicles drops off considerably in the 4-24 model year table. The remaining "M" vehicles may be related to the problem identified with the Null emissions status vehicles

Matching with 2013 IM VIN Data and Summary

When matched with the 2013 VIN data, there were 69,188 IM test records in 2013 with a pass or waiver and with no pass or waiver on record in the July DMV run. Looking only at test records prior to July, there were 493 VINS with a pass or waiver on the DEQ IM database before July 1, 2013. Most of these records should have been sent to DMV by the July DMV data run, although it is possible due to off-line testing that some records were not conveyed soon enough. DEQ investigated the status of these records – it turns out that 346 were model year 2012 and newer and still had "M" emissions status. Looking forward to the end of 2013, 59,772 DMV records in the July run with "M" emissions status had received a P or W. For vehicles with Null emissions status on the DMV record as of July 2013, 33 had and emissions P or W on record on the VID and a total of 3472 had received a P or W by the end of 2013. There was only one "C" vehicle with a pass on the IM VID by July, and only 51 total received a pass by the end of 2013.

It is also of note that there were 19,851 VINs on the IM database with a pass or waiver that occurred before May 1 that were registered in the IM area according to the inspection record but were not on the DMV registration database as of the July 2013 run. DEQ believes that some of these vehicles may have an incorrect VIN on the DMV record and consequently the registration does not show up. A new TIN algorithm in

2014 will correct this condition. We believe that this may explain much of the situation of apparent uninspected vehicles unveiled in this 51.366 (d) (1)(vi) audit. It is interesting that there were more VINs (44,229) with IM pass or waivers in the same time period that were not on the 2014 July DMV registration run. This is evidence of the amount of registration turnover.

51.366 (e) Additional reporting requirements.

51.366 (e) (1) Any changes in program design, funding, personnel levels, procedures, regulations, and legal authority.

The Virginia legislature has established expanded clean screening to be phased in up to a maximum of 30%. DEQ has finalized regulations to implement the expanded clean screen and intends to complete a contract for the services soon. We expect this enhanced remote sensing to be operational by the end of 2014.

51.366 (e) (2) Any weaknesses or problems identified within the two-year period

See 51.366 (d)(2)(ii)